

**What is claimed is:**

1           1.     A method of sampling communication signals within a mobile  
 2     satellite payload having a phase array antenna, receive radiating elements, a  
 3     plurality of low noise amplifiers (LNAs) and a plurality of analog-to-digital (A/D)  
 4     converters, comprising:

5           receiving the communication signals with the receive radiating elements  
 6     and forming received signals;

7           amplifying said received signals within the plurality of LNAs; and

8           transforming said received signals into digital baseband signals within the  
 9     plurality of A/D converters.

1           2.     A method as in claim 1 wherein transforming the received signals  
 2     further comprises filtering the received signals within the plurality of A/D  
 3     converters.

1           3.     A method as in claim 1 wherein transforming said received signals  
 2     comprises sampling the received signals at properly predetermined sampling rates.

1           4.     A method as in claim 1 wherein transforming said received signals  
 2     comprises maintaining the accuracy of said plurality of A/D converters aperture  
 3     times ( $\alpha$ ).

1           5.     A method as in claim 1 wherein transforming said received signals  
 2     further comprises sampling the received signals at a predetermined sampling  
 3     frequency  $f_s$  using an A/D converter with an aperture time of  $1/A \cdot f_s$ .

1           6.     A method as in claim 1 wherein transforming the received signals  
 2     comprises sampling the received signals at frequencies selected from the following  
 3     group: SHF, KU, EHF, L-band, S-band, and C-band.

1           7.     A method as in claim 1 wherein transforming said received signals  
2 comprises automatically filtering said received signals within the plurality of A/D  
3 converters.

4           8.     A method as in claim 1 wherein transforming said received signals  
5 incorporates downconverting said received signals within the A/D converter.

6           9.     A mobile satellite payload comprising:  
7           a phase array antenna, wherein said phase array antenna comprises a  
8 plurality of receive radiating elements;  
9           a plurality of low noise amplifiers (LNAs) electrically coupled to said  
10 receive radiating elements; and  
11           a plurality of analog-to-digital (A/D) converters electrically coupled to said  
12 LNAs, wherein said plurality of A/D converters transform received signals into  
13 digital baseband signals.

14          10.    A system as in claim 9 wherein said plurality of A/D converters  
15 incorporate the function of a downconverter.

16          11.    A system as in claim 9 wherein said plurality of A/D converters  
17 incorporate the function of a filter.

18          12.    A system as in claim 9 wherein said plurality of A/D converters  
19 operates with various aperture times.

20          13.    A system as in claim 9 wherein said plurality of A/D converters are  
21 able to perform as low pass or band pass filters.

22          14.    A system as in claim 9 wherein said plurality of A/D converters are  
23 able to sample at different predetermined sampling rates.

1          15.    A communication system comprising:

2 an antenna;  
3 a low noise amplifier (LNA) electrically coupled to said antenna; and  
4 an analog-to-digital (A/D) converter electrically coupled to said LNA,  
5 wherein said A/D converter transforms a received signal into a digital baseband  
6 signal.

7 16. A method of sampling communication signals within a mobile  
8 satellite payload having a phase array antenna, receive radiating elements, a  
9 plurality of low noise amplifiers (LNAs) and a plurality of analog-to-digital (A/D)  
10 converters, comprising:

11 receiving the communication signals through the use of the receive  
12 radiating elements and forming received signals;

13 amplifying said received signals within the plurality of LNAs;

14 downconverting said received signals within the plurality of A/D  
15 converters;

16 sampling said received signals within the plurality of A/D converters;

17 filtering said received signals within the plurality of A/D converters;

18 wherein the combination of downconverting, sampling, and filtering said  
19 received signals transforms said received signals into digital baseband signals.

1 17. A method as in claim 16 wherein sampling said received signals  
2 comprises maintaining the accuracy of said plurality of A/D converters aperture  
3 times ( $\alpha$ ).

4 18. A method as in claim 16 wherein sampling said received signals  
5 comprises sampling the received signals at properly predetermined sampling rates.

- 1            19.    A method as in claim 16 wherein sampling the received signals  
2 further comprises sampling the received signals at a predetermined sampling  
3 frequency  $f_s$  using an A/D converter with an aperture time of  $1/A \cdot f_s$ .